ANALYSIS OF BOTTLED WATER

November 4, 1983

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CITY OF TORONTO
DEPARTMENT OF PUBLIC HEALTH

Re 7

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Municipal Reference

November 4, 1983

To: Local Board of Health

Subject: Analysis of Bottled Water

Origin: Medical Officer of Health, November 4, 1983
(c34hlth83136:168)

Comments:

At its meeting on June 21, 1983, the Local Board of Health approved a recommendation from the Medical Officer of Health that Zenon Environmental Inc. laboratories be hired to conduct a chemical analysis of a selection of bottled waters sold in Toronto.

Attached are the results of these tests, along with the bacteriological results as determined by the Laboratory Service Branch, Environmental Bacteriology Section of the Ministry of Health.

Recommendation:

That the Local Board of Health received the attached report for information.

RHB:sa
Attach.

A.S. Macpherson, M.D., M.Sc.
Medical Officer of Health

BOTTLED WATER ANALYSIS

The Department of Public Health and the Metropolitan Toronto Works Department recently undertook to have a selection of bottled waters analysed, both for chemical and for bacteriological content.

The results of the Department of Public Health testing are attached. It must be noted that only one sampling for each brand is included in this report, except where the Department of Public Health and the Metropolitan Toronto Works Department agreed to test the same brand. A re-test of selected products confirmed the Department of Public Health results.

COMPARISON OF RESULTS

The two sets of results differ in small ways from each other but there are several factors that should be taken into account:

- Different laboratories were used. The Department of Public Health used Zenon Environmental Inc., whereas the Metropolitan Toronto Works Department used Mann Testing.

- The testing protocols were not identical and although there was considerable overlap, not all the same chemicals were tested for. For example, among other inorganics the Department of Public Health tested for sodium, aluminium, calcium, cobalt, iron, potassium, magnesium, manganese, molybdenum, phosphorus, strontium, titanium, vanadium and zirconium. While the Metropolitan Toronto Works Department did not test for these substances, it did include antimony, arsenic, cyanide, mercury, selenium, silver, thallium, and the uranyl iron, which the Department of Public Health did not consider.

- The Metropolitan Toronto Works Department used treated water samples, whereas the Department of Public Health used tap water samples. Treated water at the filtration plants does not necessarily represent the water being consumed. Concentrations of copper have been found to be much higher at the tap than in treated water at the filtration plants. This is because of the extensive use of copper service connections. The concentration of copper in our test water sample was 22.4 ug/L, whereas concentrations at the filtration plants were less than the detection level of 1 ug/L in three out of four measurements, the fourth being 1 ug/L.

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- The detection levels used in the Metro Works test in the organic analysis were generally lower than that of the Department of Pubic Health. This is because they used the more sensitive "electron capture" method of quantification.

GENERAL SUMMARY - CHEMICAL RESULTS

Since federal standards for bottled waters are rather limited, we compared our results to the standards suggested in the Guidelines for Canadian Drinking Water Quality 1978, a standard intended for the municipal water supply, and not for bottled water as such.

- Department of Public Health results show several instances for inorganics where the maximum acceptable concentrations for drinking water (Health and Welfare Canada) are equalled or exceeded by bottled waters.

- Sodium concentrations in one-half the brands tested by the Department were at a level (20 mg/L) considered of concern to health authorities.

- Taking organics and inorganics together, Department of Public Health results show certain brands appear equivalent in quality to Toronto's drinking water.

- All concentrations reported by the Metropolitan Toronto Works Department are below maximum acceptable concentrations, where such have been set.

- The Metropolitan Toronto Works Department results show that, generally speaking, bottled waters have an inferior quality to Toronto's drinking water, largely due to the presence of organics at very low concentrations.

- In the three jointly tested brands, the Department of Public Health results were higher than the Metropolitan Toronto Works Department results for several inorganics.

- The question of whether any of the waters is "safe", or "safer" than another, can only be properly answered by first establishing an overall risk estimate for each water. This would require considerable additional analysis, and would also require many more sampling results to be valid.

- The results of both the Department of Public Health tests and those of the Metropolitan Toronto Works Department indicate that, excepting trihalomethanes, the quality of bottled waters may be poorer than, or equal to, that of Toronto's drinking water. The presence of trihalomethanes in our drinking water

undoubtedly introduces an additional risk over a lifetime's consumption. This risk should be addressed by examining possible ways of improving the existing disinfection methods, so that it can be minimized. It should not be addressed by encouraging the consumption of bottled waters.

COMMENTS

For the three brands tested by both the Metropolitan Toronto Works Department and the Department of Public Health, generally higher concentrations were found for the same inorganics in the Department of Public Health samples than in the Metropolitan Toronto Works Department samples. For example, we found higher concentrations of silver, boron and cadmium in all three brands, and higher concentrations of barium, copper, nickel and zinc in two out of the three brands. This is probably because of different experimental techniques in the two labs.

When the organic concentrations are compared for the three jointly tested brands, the picture is complicated by the detection level problem mentioned above. Therefore, only organic concentrations significantly above detection levels were compared. The Metropolitan Toronto Works Department found toluene in MT2, while the Department of Public Health did not, but the concentration at which it was detected was less than our detection level. Metro Works identified phenol in MT2 and MT10, and the Department of Public Health did not (detection levels were not a problem here). Results on phthalate concentrations were also contradictory; Metro Works found them in MT2 (DPH7) and MT14 (DPH10), while the Department of Public Health found them in DPH3 (MT10) only. Concentrations detected were equivalent.

These differences show how unwise it is to place an absolute reliance on numbers. Numbers such as these can be used to show the approximate concentration of a particular chemical only. These differences probably reflect not so much the different batches or bottles of bottled waters that were sampled, but differences in experimental procedures such as how the samples were handled and the analytical equipment used in the two labs. Given these constraints, the results are not in substantial disagreement.

BACTERIOLOGICAL RESULTS

ALso attached are the findings of the bacteriological results obtained for three samplings by the Public Health Laboratories of the Ministry of Health.

It should be noted that the Aerobic Plate Count (APC) is a measurement of the general bacterial quality of the water. The federal Guidelines for Canadian Drinking Water Quality 1978 suggest that an APC in excess of 500/mL may indicate the need for disinfection in the case of drinking water. As noted previously, these Guidelines are not applicable to bottled waters, and the APC results are not considered under existing federal standards for mineral waters. Our cooperative discussions with the federal authority and MT14 - DPH10 are addressing the high readings found in early tests of their product. We have received recent information that samples of their current production runs of this particular water show much improved readings.

Department of Public Health

Bottled water samples:

DPH 1	Spa
DPH 2	Steiner Sprudel
DPH 3	Perrier
DPH 4	Ferrarelle
DPH 5	Maqua
DPH 6	Mont Rose
DPH 7	Crystal Spring
DPH 8	Tap water
DPH 9	Loblaws No Name
DPH 10	Laurentian Mineral

BOTTLED WATER - SYNOPSIS OF BACTERIOLOGICAL RESULTS

The following is a synopsis of our results processed through the Ministry of Health.

	August 11			September 23			October 21 (Sealed)		
	Coliform /100 ml		APC /ml	Coliform /100 ml		APC /ml	Coliform /100 ml		APC /ml
Brand	Faecal	Total		Faecal	Total		Faecal	Total	
Spa	0	0	<10	0	0	<10	0	0	<10
Gerolsteiner Sprudel	0	0	<10	0	0	<10	0	0	<10
Perrier	0	0	<10	0	0	<10	0	0	<10
Ferrarelle	0	0	30	0	0	<10	0	0	20
Maqua	0	0	480	0	0	<10	0	0	150
Mont Roseé	0	0	<10	0	0	<10	0	0	<10
Crystal Springs	0	0	60	0	0	<10	0	0	<10
Tap Water	0	2	<10	0	0	<10	-	-	Sample defective en route to La
Loblaws No Name	0	0	10	0	0	<10	0	0	<10
Laurentian Mineral	0	0	>2,000	0	0	>2,000	-	-	To be sampl as arranged

TABLE - 1
VOLATILES ANALYSIS

TORONTO WATER- VOLATILES (UG/L)

PURGEABLE COMPOUNDS	DETECTION LIMIT	DPH1	DPH2	DPH3	DPH4	DPH5	DPH6	DPH7	DPH8	DPH9	DPH10
BENZENE	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHLOROBENZENE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-CHLOROETHANE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-TRICHLOROETHANE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-TETRACHLOROETHANE	2	ND	ND	8.0	ND	ND	ND	ND	ND	ND	ND
CHLOROFORM	2	ND	ND	ND	ND	ND	ND	ND	15.0	ND	ND
1,1-DICHLOROETHYLENE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-TRANS-DICHLOROETHYLENE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-DICHLOROPROPYLENE-CIS	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-DICHLOROPROPYLENE-TRANS	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETHYLBENZENE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BROMOFORM	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DICHLOROBROMOMETHANE	2	ND	ND	ND	ND	ND	ND	ND	14.4	ND	ND
TRICHLOROFLUOROMETHANE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHLORODIBROMOMETHANE	2	ND	ND	ND	ND	8.3	ND	ND	6.8	ND	ND
TETRACHLOROETHYLENE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOLUENE	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHYLENE	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND= NOT DETECTED

TABLE - 2

SEMIVOLATILES ANALYSIS

WATER SAMPLES EPA PRIORITY POLLUTANTS
DRINKING WATER (UG/L)

BASE-NEUTRAL EXTRACTABLES	DETECTION LIMIT	DPH1	DPH2	DPH3	DPH4	DPH5	DPH6	DPH7	DPH8	DPH9	DPH10
ACENAPHTHENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-TRICHLOROBENZENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HEXACHLOROBENZENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BIS(2-CHLOROETHYL) ETHER	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HEXACHLOROETHANE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-CHLORONAPHTHALENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FLUORANTHENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-CHLOROPHENYL PHENYL ETHER	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-BROMOPHENYL PHENYL ETHER	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HEXACHLOROBUTADIENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HEXACHLOROCYCLOPENTADIENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NAPHTHALENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-NITROSODIPHENYLAMINE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DIMETHYL PHTHALATE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DIETHYL PHTHALATE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DI-N-BUTYL PHTHALATE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BUTYL BENZYL PHTHALATE	1.0	ND	ND	3.7	ND	ND	ND	ND	ND	ND	ND
BIS(2-ETHYLHEXYL) PHTHALATE	1.0	ND	ND	3.9	3.7	ND	4.9	ND	ND	2.3	ND
DI-N-OCTYL PHTHALATE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(A)ANTHRACENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CHRYSENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(A)PYRENE	10.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ACENAPHTHYLENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ANTHRACENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHENANTHRENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZO(GHI)PERYLENE	10.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FLUORENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DIBENZO(AH)ANTHRACENE	10.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
INDENO(1,2,3-C,D)PYRENE	10.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PYRENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3,3-DICHLOROBENZIDINE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BENZIDINE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-DINITROTOLUENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,6-DINITROTOLUENE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-DIPHENYLHYDRAZINE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ISOPHORONE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-NITROSO-N-PROPYLAMINE	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND=NOT DETECTED

TABLE 2 (CONT'D.)

WATER SAMPLES EPA PRIORITY POLLUTANTS
DRINKING WATER (UG/L)

ACID EXTRACTABLES	DETECTION LIMIT	DPH1	DPH2	DPH3	DPH4	DPH5	DPH6	DPH7	DPH8	DPH9	DPH10
2,4,6-TRICHLOROPHENOL	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P-CHLORO-M-CRESOL	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
P-CHLOROPHENOL	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-DICHLOROPHENOL	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-DIMETHYL PHENOL	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-NITROPHENOL	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-NITROPHENOL	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-DINITROPHENOL	10.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4,6-DINITRO-O-CRESOL	10.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PENTACHLOROPHENOL	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHENOL	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND=NOT DETECTED

TABLE 3 - ORGANOCHLORINES/PCB ANALYSIS

WATER SAMPLES EPA PRIORITY POLLUTANTS
DRINKING WATER (UG/L)

CHLORINATED HYDROCARBONS AND POLYCHLORINATED BIPHENYLS	DETECTION LIMIT	DPH1	DPH2	DPH3	DPH4	DPH5	DPH6	DPH7	DPH8	DPH9	DPH10
1,3-DICHLOROBENZENE	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-TRICHLOROBENZENE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-TRICHLOROBENZENE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-TRICHLOROBENZENE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1235+1245-TETRACHLOROBENZENE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3,4-TETRACHLOROBENZENE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PENTACHLOROBENZENE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HEXACHLOROBENZENE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A-BENZENEHEXACHLORIDE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
G-BENZENEHEXACHLORIDE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HEPTACHLOR EPOXIDE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DIELDRIN	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ENDRIN	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p,p-DDE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
o,p-DDT	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p,p-DDD	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p,p-DDT	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
A-CHLORDANE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
G-CHLORDANE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
OXYCHLORDANE	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MIREX	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
METHOXYCHLOR	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PHOTOMIREX	0.0001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL PCB	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND=NOT DETECTED

TABLE 4 - ANALYTICAL RESULTS - TRACE ELEMENTS

SAMPLE ID	AG PPM	AL PPM	B PPM	BA PPM	BE PPM	CA PPM	CD PPM	CO PPM	CR PPM
DPH-1	<.0005	.005	.0031	.0096	<.00005	3.66	.001	<.005	<.001
DPH-2	.0129	.088	.105	.0267	<.00005	279	.005	<.005	<.001
DPH-3	.0071	<.001	.0243	.0033	<.00005	156	.002	<.005	<.001
DPH-4	.0320	.209	.442	.0630	.00129	477	.005	<.005	<.001
DPH-5	<.0005	.090	.0417	.0872	<.00005	20.8	<.001	<.005	.001
DPH-6	.0061	.004	.0332	.0457	<.00005	119	.003	<.005	.001
DPH-7	.0046	.049	.0148	.0518	<.00005	87.1	.003	<.005	<.001
DPH-8	.0018	.090	.0164	.0186	<.00005	40.4	.002	<.005	.001
DPH-9	<.0005	.019	.433	.236	<.00005	4.68	<.001	<.005	.011
DPH-10	.0009	.024	.147	.0371	<.00005	33.9	.002	<.005	.001

SAMPLE ID	CU PPM	FE PPM	K PPM	HG PPM	MN PPM	MO PPM	NA PPM	NI PPM	P PPM
DPH-1	.0056	.009	.2	1.24	.029	<.02	3.5	.065	<.05
DPH-2	.0071	.026	18.0	103	.218	<.02	119	.023	.08
DPH-3	.0093	.144	.6	3.58	<.001	<.02	13.5	.012	<.05
DPH-4	.0077	.019	45.6	23.8	<.001	<.02	52.3	.012	.15
DPH-5	.0036	.126	3.2	8.76	.001	<.02	64.2	<.005	1.22
DPH-6	.0252	.012	1.6	24.5	.012	<.02	10.5	.008	<.05
DPH-7	.0093	.011	1.3	18.5	<.001	<.02	8.0	.007	<.05
DPH-8	.0224	.020	1.6	8.67	<.001	<.02	13.3	.005	<.05
DPH-9	.0389	.130	5.0	5.94	.004	<.02	308	.011	.17
DPH-10	.0054	.072	4.3	12.9	.019	<.02	181	.044	<.05

SAMPLE ID	PB PPM	SR PPM	TH PPM	TI PPM	U PPM	ZN PPM	ZR PPM
DPH-1	<.5	.0111	<.005	<.0005	<.0005	.060	<.005
DPH-2	.5	1.26	<.005	<.0005	<.0005	<.005	<.005
DPH-3	<.5	.439	<.005	<.0005	<.0005	.008	<.005
DPH-4	<.5	.654	<.005	<.0005	<.0005	.008	.009
DPH-5	<.5	.565	<.005	<.0005	<.0005	<.005	<.005
DPH-6	.5	.236	<.005	<.0005	<.0005	.081	<.005
DPH-7	.5	.130	<.005	<.0005	<.0005	.017	<.005
DPH-8	<.5	.166	<.005	<.0005	<.0005	.008	<.005
DPH-9	.5	1.19	<.005	<.0005	<.0005	.012	<.005
DPH-10	<.5	3.29	<.005	<.0005	<.0005	<.005	<.005

TABLE - 5

NON EPA EXTRACTABLES

ANALYTICAL DATA-CONTAMINANTS IDENTIFIED
IN WATER SAMPLES (UG/L)

CONTAMINANT	DETECTION LIMIT	DPH1	DPH2	DPH3	DPH4	DPH5	DPH6	DPH7	DPH8	DPH9	DPH10
PHENOL-2,6 BIS(1,1-DIMETHYL ETHYL),4-METHYL *	1.0	2.0	1.0	1.7	ND	ND	ND	ND	ND	ND	ND
PHENOL-4,4-(1-METHYLETHYL IDENE) BIS *	1.0	ND	ND	ND	4.1	ND	ND	ND	ND	ND	ND
DICHLOROBENZAMIDE	1.0	ND	ND	3.9	ND	ND	ND	ND	ND	ND	ND
INTERNAL STANDARDS % RECOVERY											
D4-CHLOROPHENOL	1.0	NA	60.0	60.0	66.0	91.0	91.0	80.0	94.0	80.0	51.0
D10-ANTHRACENE	1.0	87.0	68.0	73.0	77.0	85.0	120.0	99.0	126.0	98.0	113.0

* BEST LIBRARY MATCH
ND= NOT DETECTED
NA= NOT AVAILABLE

POOR

QUALITY

ORIGINAL